The documentation and process conversion measures necessary to comply with this revision shall be completed by 26 September 1995

INCH-POUND

MIL-S-19500/350D
26 June 1995
SUPERSEDING
MIL-S-19500/350C
25 September 1992

MILITARY SPECIFICATION

SEMICONDUCTOR DEVICE, TRANSISTOR, PNP, SILICON, LOW-POWER
TYPES: 2N3867, 2N3867S, 2N3868, AND 2N3868S
JAN, JANTX, JANTXV, JANS, JANHC, AND JANKC

This specification is approved for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This specification covers the detail requirements for PNP, silicon, switching transistor. Four levels of product assurance are provided for each encapsulated device type as specified in MIL-S-19500, and two levels of product assurance for each unencapsulated device type die.

1.2 Physical dimensions. See figure 1 (TO-5) encapsulated devices, figures 2, and 3 for unencapsulated devices.

1.3 Maximum ratings. Unless otherwise specified, T_A = +25°C.

Type	P_T T_A = +25°C 1/	P_T T_C = +25°C 2/	V_{CBO}	V_{CEO}	V_{EBO}	I_C	T_{STG} and T_{OP}	$R_{\theta JC}$
	W	W	V dc min.	V dc min.	V dc	A dc	°C	°C/W
2N3867,S	1.0	10	40	40	4.0	3.0	-65 to +200	17.5
2N3868,S	1.0	10	60	60	4.0	3.0	-65 to +200	17.5

1/ Derate linearly 5.71 mW/°C for T_A > +25°C.
2/ Derate linearly 57.1 mW/°C for T_C > +25°C.

1.4 Primary electrical characteristics.

	h_{FE}				C_{obo}	$\lvert h_{fe} \rvert$	I_C = 1.5 A dc		$V_{CE(sat)}$ 2
	I_C = 1.5 A dc, V_{CE} = 2 V dc		I_C = 3.0 A dc, V_{CE} = 5 V dc		I_E = 0, V_{CB} = 10 V dc, 100 kHz ≤ f ≤ 1 MHz	I_C = 100 mA ac, V_{CE} = 5 V dc, f = 20 MHz	I_B = 150 mA dc		I_C = 1.5 A dc, I_B = 150 mA dc
							t_{on}	t_{off}	
	2N3867 2N3867S	2N3868 2N3868S	2N3867 2N3867S	2N3868 2N3868S	pF		ns max	ns max	V dc
Min	40	30	20	20		3			
Max	200	150			120	12	100	600	0.75

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Defense Electronic Supply Center, ATTN: DESC-ELDT, 1507 Wilmington Pike, Dayton, OH 45444-5765 by using the Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

AMSC N/A

FSC 5961

DISTRIBUTION STATEMENT A. Approved for public release; distribution is unlimited.

2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Specifications, standards, and handbooks. The following specifications, standards, and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those listed in the issue of the Department of Defense Index of Specifications and Standards (DODISS) and supplement thereto, cited in the solicitation (see 6.2).

SPECIFICATION

MILITARY

MIL-S-19500 - Semiconductor Devices, General Specification for.

STANDARD

MILITARY

MIL-STD-750 - Test Methods for Semiconductor Devices.

(Unless otherwise indicated, copies of federal and military specifications, standards, and handbooks are available from the Defense Printing Service Detachment Office, Building 4D (Customer Service), 700 Robbins Avenue, Philadelphia, PA 19111-5094).

2.2 Non-Government publications. The following document forms a part of this document to the extent specified herein. Unless otherwise specified, the issues of the documents which are DoD adopted are those listed in the issue of the DODISS cited in the solicitation. Unless otherwise specified, the issues of documents not listed in the DODISS are the issues of the documents cited in the solicitation (see 6.2).

AMERICAN NATIONAL STANDARDS INSTITUTE

ANSI Y14.5M - Dimensioning and Tolerancing.

(Application for copies should be addressed to the American National Standards Institute, 11 West 42nd STreet, New York, NY 10036.)

2.3 Order of precedence. In the event of a conflict between the text of this document and the references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 Associated detail specification. The individual item requirements shall be in accordance with MIL-S-19500 and as specified herein.

3.2 Abbreviations, symbols, and definitions. Abbreviations, symbols, and definitions used herein shall be as specified in MIL-S-19500.

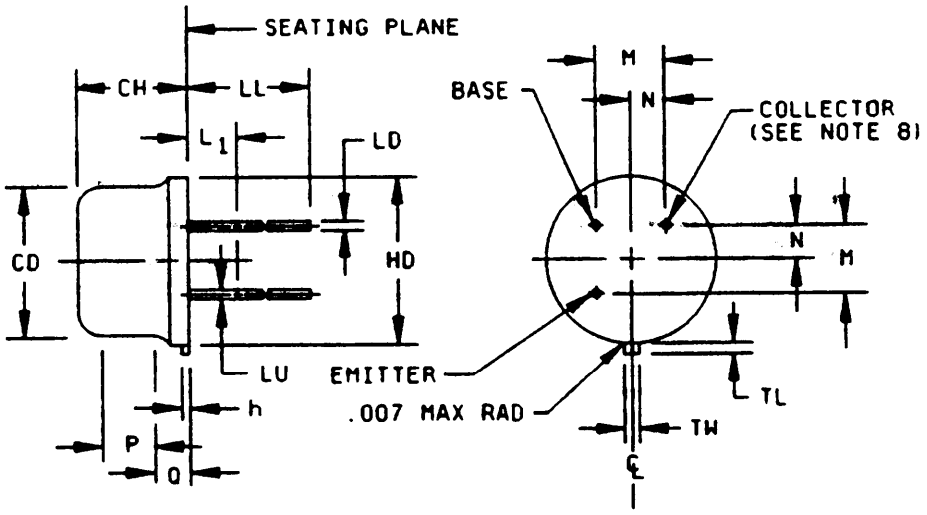
3.3 Design, construction, and physical dimensions. The design, construction, and physical dimensions shall be as specified in MIL-S-19500, and on figures 1, 2, and 3 herein.

3.3.1 Lead material and finish. Lead material shall be Kovar, Alloy 52, or approved equivalent. Lead finish shall be solderable in accordance with MIL-STD-750, MIL-S-19500 and as specified herein. Where a choice of lead finish is desired, it shall be specified in the acquisition document (see 6.2).

3.4 Marking. Marking shall be in accordance with MIL-S-19500.

4. QUALITY ASSURANCE PROVISIONS

4.1 Sampling and inspection. Sampling and inspection shall be in accordance with MIL-S-19500, and as specified herein.

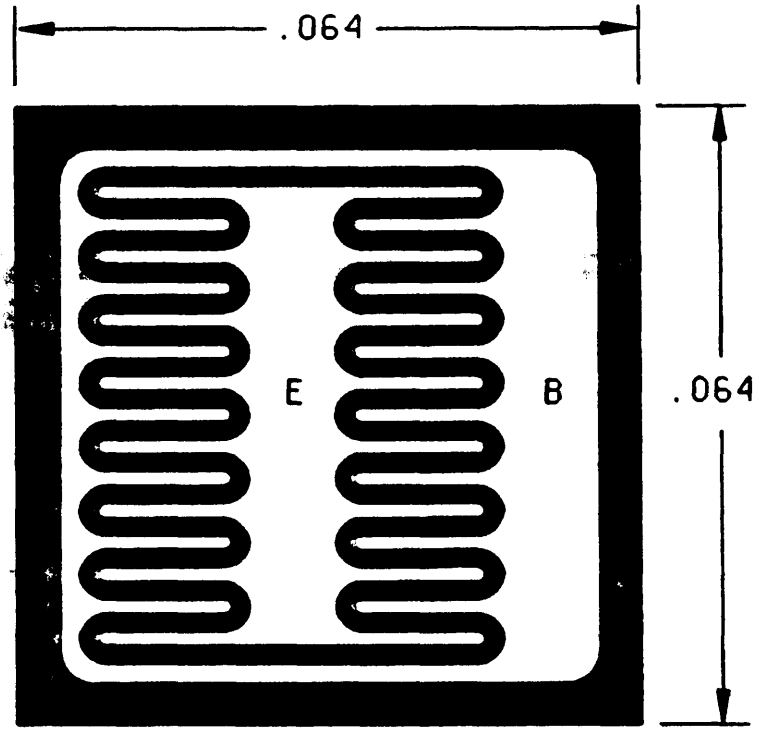


Ltr	Dimensions				Notes	Ltr	Dimensions				Notes
	Inches		Millimeters				Inches		Millimeters		
	Min	Max	Min	Max			Min	Max	Min	Max	
HD	.335	.370	8.51	9.40	14	P	.100		2.54		5
CD	.305	.335	7.75	8.51	14	Q					6
CH	.240	.260	6.10	6.60		TL	.029	.045	0.74	1.14	9
LL	See notes				10,12,13	TW	.028	.034	0.71	0.86	
L_1		.050		1.27	11	h	.009	.125	0.23	3.18	
LD	.016	.021	0.41	0.53	3,10,14	M	.1414 Nom		3.59 Nom		7
LU	.016	.019	0.41	0.48	4,10,14	N	.0707 Nom		1.80 Nom		7

FIGURE 1. Physical dimensions.

NOTES:
1. Dimensions are in inches.
2. Metric equivalents are given for general information only.
3. Measured in the zone beyond .250 inch (6.35 mm) from the seating plane.
4. Measured in the zone .050 inch (1.27 mm) and .250 inch (6.35 mm) from the seating plane.
5. Variations on dimension CD in this zone shall not exceed .010 inch (0.25 mm).
6. Outline in this zone is not controlled.
7. When measured in gauging plane .054 +.001, -.000 inch (1.37 +0.03, -0.00 mm) below the seating plane of the transistor, maximum diameter leads shall be within .007 inch (0.18 mm) of their true location relative to a maximum width tab. Smaller diameter leads shall fall within the outline of the maximum diameter lead tolerance. Figure 4 shows the preferred method of measurement.
8. The collector shall be electrically connected to the case.
9. Measured from the maximum diameter of the actual device.
10. All 3 leads (see 3.3.1).
11. Diameter of leads in this zone is not controlled.
12. For transistor types 2N3867 and 2N3868, dimension LL shall be 1.500 inches (38.10 mm) minimum and 1.75 inches (44.5 mm) maximum.
13. For transistor types 2N3867S and 2N3868S, dimension LL shall be 0.5 inch (13 mm) minimum and 0.75 inch (19.1 mm) maximum.
14. In accordance with ANSI Y14.5M, diameters are equivalent to ϕx symbology.

FIGURE 1. Physical dimensions - Continued.

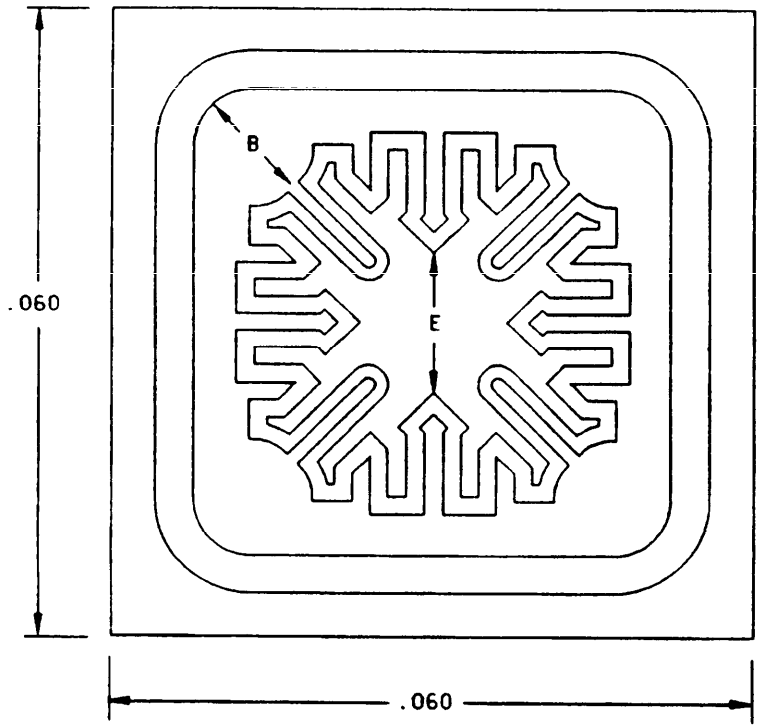


Inches	mm
.064	1.63

A version

NOTES:
1. Dimensions are in inches.
2. Metric equivalents are given for general information only.
3. Unless otherwise specified, tolerance is ±.005 inch (0.13 mm).
4. The physical characteristics of the die are:
   Thickness is .008 inch (0.20 mm) minimum, .012 inch (0.30 mm) maximum.
   Top metal: Aluminum 25,000 Å nominal.
   Back metal: Gold 2,500 Å minimum, 3,000 Å nominal.
   Back side: Collector; Bonding pad: B = .045 inch (1.14 mm) x .008 inch (0.20 mm).
   E = .039 inch (0.99 mm) x .008 inch (0.20 mm).

FIGURE 2. JANHCA and JANKCA die dimensions.



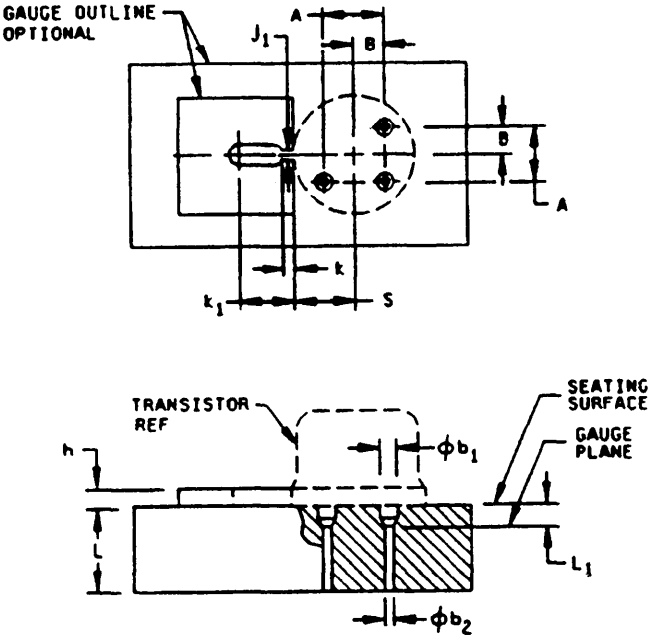
Inches	mm
.060	1.52

C version

NOTES:
1. Dimensions are in inches.
2. Metric equivalents are given for general information only.
3. Unless otherwise specified, tolerance is ±.005 inch (0.13 mm).
4. The physical characteristics of the die are:
   Thickness is .007 inch (0.18 mm) nominal.
   Top metal: Aluminum 25,000 Å minimum, 30,000 Å nominal.
   Back metal: Gold 1,500 Å minimum, 2,500 Å nominal.
   Back side: Collector; Bonding pad: B = .012 inch (0.30 mm) diameter.
   E = .012 inch (0.30 mm) diameter.

FIGURE 3. JANHCC and JANKCC die dimensions.

Ltr	Dimensions			
	Inches		Millimeters	
	Min	Max	Min	Max
A	.1409	.1419	3.58	3.60
B	.0702	.0712	1.78	1.81
S	.182	.199	4.62	5.05
k	.009	.011	0.23	0.28
k_1	.125 Nom		3.18 Nom	
L_1	.054	.055	1.37	1.40
L	.372	.378	9.45	9.60
j_1	.0350	.0355	0.89	0.90
h	.150 Nom		3.81 Nom	
ϕb_2	.0325	.0335	0.83	0.85
ϕb_1	.0595	.0605	1.51	1.54



NOTES:
1. Dimensions are in inches.
2. Metric equivalents are given for general information only.
3. The following gauging procedure shall be used: The use of a pin straightener prior to insertion in the gauge is permissible. The device being measured shall be inserted until its seating plane is .125 ±.010 inch (3.18 ±0.25 mm) from the seating surface of the gauge. A spacer may be used to obtain the .125 inch (3.18 mm) distance from the gauge seat prior to force application. A force of 8 oz ±.50 oz shall then be applied parallel and symmetrical to the advice's cylindrical axis. When examined visually after the force application (the force need not be removed), the seating plane of the device shall be seated against the gauge.
4. The location of the tab locator, within the limits of dimension 3, will be determined by the tab and flange dimension of the device being checked.

FIGURE 4. Gauge for lead and tab location.

4.2 Qualification inspection. Qualification inspection shall be in accordance with MIL-S-19500.

4.2.1 JANHC and JANKC die. Qualification shall be in accordance with appendix H of MIL-S-19500.

4.3 Screening (JANS, JANTX, and JANTXV levels only). Screening shall be in accordance with table II of MIL-S-19500, and as specified herein. The following measurement shall be made in accordance with table I herein. Devices that exceed the limits of tables I and II herein shall not be acceptable.

Screen (see table II of MIL-S-19500)	Measurement	
	JANS level	JANTX and JANTXV levels
1/	Thermal impedance (see 4.3.3)	Thermal impedance (see 4.3.3)
9	$I_{CEX}1$ and $h_{FE}2$	Not applicable
11	$I_{CEX}1$ and $h_{FE}2$; $\Delta I_{CEX}1$ = 100 percent of initial value or 200 nA dc, whichever is greater; $\Delta h_{FE}2$ = ±15 percent of initial value.	$I_{CEX}1$ and $h_{FE}2$
12	See 4.3.2	See 4.3.2
13 2/	Subgroup 2 of table I herein; $\Delta I_{CEX}1$ = 100 percent of initial value or 200 nA dc, whichever is greater; $\Delta h_{FE}2$ = ±15 percent of initial reading.	Subgroup 2 of table I herein; $\Delta I_{CEX}1$ = 100 percent of initial value or 200 nA dc, whichever is greater; $\Delta h_{FE}2$ = ±15 percent of initial reading.

1/ This test shall be performed anytime before screen 9.
2/ Thermal impedance need not be retested in screen 13, when it was previously tested in another screen.

4.3.1 Screening (JANHC and JANKC). Screening of JANHC and JANKC die shall be in accordance with MIL-S-19500, appendix H.

4.3.2 Power burn-in conditions. Power burn-in conditions are as follows:

T_A = Room ambient as defined in the general requirements of MIL-STD-750, (see 4.5)
P_T = 1.0 W.
2N3867, 2N3867S: V_{CB} = 30 V dc.
2N3868, 2N3868S: V_{CB} = 45 V dc.
JANS devices: V_{CB} = 10 V dc.

4.3.3 Thermal impedance ($Z_{\Theta JX}$ measurements). The $Z_{\Theta JX}$ measurements shall be performed in accordance with MIL-S-19500, method 3131. Read and record data ($Z_{\Theta JX}$) shall be supplied to the qualifying activity on one lot (random sample of 500 devices minimum). Twenty-two of these samples shall be serialized and they shall be provided to the qualifying activity for test correlation. One hundred percent safe operating area (SOA) testing may be performed in lieu of thermal impedance testing herein provided that the appropriate conditions of temperature, time, current, and voltage to achieve die attach integrity are submitted to the qualifying activity.

a. I_H measurement current . . . . . 10 mA.

b. I_H forward heating current . . . . . 2 A to 3 A.

c. t_H heating time . . . . . 10 ms.

d. t_{MD} measurement delay time . . . . . 50 µs maximum.

The maximum limit for $Z_{\Theta JX}$ under these test conditions are $Z_{\Theta JX}$ (maximum) = 5.4°C/W.

4.4 Quality conformance inspection. Quality conformance inspection shall be in accordance with MIL-S-19500.

4.4.1 Group A inspection. Group A inspection shall be conducted in accordance with MIL-S-19500 and table I herein. (End-point electrical measurements shall be in accordance with the applicable steps of table II herein.)

4.4.2 Group B inspection. Group B inspection shall be conducted in accordance with the conditions specified for subgroup testing in table IVb (JANTX and JANTXV) of MIL-S-19500. Electrical measurements (end-points) and delta requirements shall be in accordance with the applicable steps of table II herein.

4.4.2.1 Group B inspection, table IVa of MIL-S-19500.

Subgroup	Method	Conditions
B4	1037	V_{CB} = 10 V dc, P_T = 1.0 W at T_A = +30°C ±5°C, t_{on} = t_{off} = 3 minutes for 2,000 cycles.
B5	1027	V_{CB} = 10 V dc, T_A = +125°C ±25°C for 96 hours, P_T = 1.0 W at T_A = +100°C or adjusted as required by the chosen T_A to give an average lot T_J = +275°C. Marking legibility requirements shall not apply.
B6	3131	$R_{\Theta JC}$ = 17.5°C/W, see 4.5.2.

4.4.2.2 Group B inspection, table IVb of MIL-S-19500.

Subgroup	Method	Conditions
B3	1027	$V_{CB} \geq$ 10 V dc, P_T = 1.0 W at T_A = +30°C ±5°C.

4.4.3 Group C inspection. Group C inspection shall be conducted in accordance with the conditions specified for subgroup testing in table V of MIL-S-19500. Electrical measurements (end-points) and delta requirements shall be in accordance with the applicable steps of table II herein.

4.4.3.1 Group C inspection, table V of MIL-S-19500.

Subgroup	Method	Conditions
C2	2036	Test condition E.
C3	2046	Nonoperating.
C6	1026	$V_{CB} \geq$ 10 V dc, P_T = 1.0 mW at T_A = +30°C ±5°C.

4.5 Methods of inspection. Methods of inspection shall be as specified in the appropriate tables and as follows.

4.5.1 Pulse measurements. Conditions for pulse measurement shall be as specified in section 4 of MIL-STD-750.

TABLE I. Group A inspection.

Inspection 1/	MIL-STD-750		Symbol	Limits		Unit
	Method	Conditions		Min	Max	
Subgroup 1						
Visual and mechanical inspection	2071					
Subgroup 2						
Breakdown voltage, collector to base	3001	Bias condition D, I_C = 100 μA dc	$V_{(BR)CBO}$			
2N3867,S				40		V dc
2N3868,S				60		V dc
Breakdown voltage, emitter to base	3026	Bias condition D, I_E = 100 μA dc	$V_{(BR)EBO}$	4.0		V dc
Breakdown voltage, collector to emitter	3011	Bias condition D, I_C = 20 mA dc, pulsed (see 4.5.1)	$V_{(BR)CEO}$			
2N3867,S				40		V dc
2N3868,S				60		V dc
Collector to emitter cutoff current	3041	Bias condition A, V_{EB} = 2.0 V dc	I_{CEX1}		1.0	μA dc
2N3867,S		V_{CE} = 40 V dc,				
2N3868,S		V_{CE} = 60 V dc				
Forward-current transfer ratio	3076	V_{CE} = 1.0 V dc, I_C = 500 mA dc, pulsed (see 4.5.1)	h_{FE1}			
2N3867,S				50		
2N3868,S				35		
Forward-current transfer ratio	3076	V_{CE} = 2.0 V dc, I_C = 1.5 A dc, pulsed (see 4.5.1)	h_{FE2}			
2N3867,S				40	200	
2N3868,S				30	150	
Forward-current transfer ratio	3076	V_{CE} = 3.0 V dc, I_C = 2.5 A dc, pulsed (see 4.5.1)	h_{FE3}			
2N3867,S				25		
2N3868,S				20		
Forward-current transfer ratio	3076	V_{CE} = 5.0 V dc, I_C = 3.0 A dc, pulsed (see 4.5.1)	h_{FE4}	20		

See footnote at end of table.

TABLE I. Group A inspection - Continued.

Inspection 1/	MIL-STD-750		Symbol	Limits		Unit
	Method	Conditions		Min	Max	
Subgroup 2 - Continued						
Collector to emitter voltage (saturated)	3071	I_C = 500 mA dc, I_B = 50 mA dc, pulsed (see 4.5.1)	$V_{CE(sat)1}$		0.5	V dc
Collector to emitter voltage (saturated)	3071	I_C = 1.5 A dc, I_B = 150 mA dc, pulsed (see 4.5.1)	$V_{CE(sat)2}$		0.75	V dc
Collector to emitter voltage (saturated)	3071	I_C = 2.5 A dc, I_B = 250 mA dc, pulsed (see 4.5.1)	$V_{CE(sat)3}$		1.5	V dc
Base emitter voltage (saturated)	3066	Test condition A, I_B = 50 mA dc, I_C = 500 mA dc, pulsed (see 4.5.1)	$V_{BE(sat)1}$		1.0	V dc
Base emitter voltage (saturated)	3066	Test condition A, I_B = 150 mA dc, I_C = 1.5 A dc, pulsed (see 4.5.1)	$V_{BE(sat)2}$	0.9	1.4	V dc
Base emitter voltage (saturated)	3066	Test condition A, I_B = 250 mA dc, I_C = 2.5 A dc, pulsed (see 4.5.1)	$V_{BE(sat)3}$		2.0	V dc
Subgroup 3						
High temperature operation:		T_A = +150°C				
Collector to emitter cutoff current	3041	Bias condition A, V_{EB} = 2.0 V dc	I_{CEX2}		200	µA dc
2N3867,S		V_{CE} = 40 V dc				
2N3868,S		V_{CE} = 60 V dc				
Low temperature operation:		T_A = -55°C				
Forward-current transfer ratio	3076	V_{CE} = 1.0 V dc, I_C = 500 mA dc, pulsed (see 4.5.1)	h_{FE5}			
2N3867,S				25		
2N3868,S				17		

See footnote at end of table.

TABLE I. Group A inspection - Continued.

Inspection 1/	MIL-STD-750		Symbol	Limits		Unit
	Method	Conditions		Min	Max	
Subgroup 4						
Magnitude of common-emitter small-signal short-circuit forward-current transfer ratio	3306	V_{CE} = 5 V dc, I_C = 100 mA dc, f = 20 MHz	$\|h_{fe}\|$	3	12	
Open circuit output capacitance	3236	V_{CB} = 10 V dc, I_E = 0, 100 kHz ≤ f ≤ 1 MHz	C_{obo}		120	pF
Input capacitance (output open-circuited)	3240	V_{EB} = 3.0 V dc, I_C = 0, 100 kHz ≤ f ≤ 1 MHz	C_{ibo}		800	pF
Subgroup 5						
Pulse response	3251	Test condition A				
Delay time		V_{CC} = -30 V dc, V_{EB} = 0, I_C = 1.5 A dc, I_{B1} = 150 mA dc, See figure 5	t_d		35	ns
Rise time		V_{CC} = -30 V dc, V_{EB} = 0, I_C = 1.5 A dc, I_{B1} = 150 mA dc, See figure 5	t_r		65	ns
Storage time		V_{CC} = -30 V dc, V_{EB} = 0, I_C = 1.5 A dc, I_{B1} = I_{B2} = 150 mA dc, See figure 6	t_s		500	ns
Fall time		V_{CC} = -30 V dc, V_{EB} = 0, I_C = 1.5 A dc, I_{B1} = I_{B2} = 150 mA dc, See figure 6	t_f		100	ns
Subgroup 6						
SOA (continuous dc)	3051	T_C = +25°C, 1 cycle, t = 1.0 s, (see figure 7)				
Test 1		V_{CE} = 3.33 V dc, I_C = 3 A dc				
Test 2						
2N3867, 2N3867S		V_{CE} = 40 V dc, I_C = 160 mA dc				
2N3868, 2N3868S		V_{CE} = 60 V dc, I_C = 80 mA dc				
Electrical measurements		See table II, steps 2 and 3				

1/ For sampling plan, see MIL-S-19500.

TABLE II. Groups A, B, and C electrical measurements. 1/ 2/ 3/ 4/

Step	Inspection	MIL-STD-750		Symbol	Limits		Unit
		Method	Conditions		Min	Max	
1.	Collector to emitter cutoff current 2N3867,S 2N3868,S	3041	Bias condition A, V_{EB} = 2.0 V dc V_{CE} = 40 V dc V_{CE} = 60 V dc	I_{CEX1}		1.0	µA dc
2.	Collector to emitter cutoff current 2N3867,S 2N3868,S	3041	Bias condition A, V_{EB} = 2.0 V dc V_{CE} = 40 V dc V_{CE} = 60 V dc	I_{CEX1}		2.0	µA dc
3.	Forward-current transfer ratio 2N3867,S 2N3868,S	3076	V_{CE} = 2.0 V dc, I_C = 1.5 A dc, pulsed (see 4.5.1)	h_{FE2}	 40 30	 200 150	
4.	Collector to emitter voltage (saturated)	3071	I_C = 1.5 A dc, I_B = 150 mA dc, pulsed (see 4.5.1)	$V_{CE(sat)2}$		0.75	V dc
5.	Base to emitter voltage (saturated)	3066	Test condition A, I_B = 150 mA dc, I_C = 1.5 A dc, pulsed (see 4.5.1)	$V_{BE(sat)2}$	0.9	1.4	V dc
6.	Collector to emitter cutoff current 2N3867,S 2N3868,S	3041	Bias condition A, V_{EB} = 2.0 V dc V_{CE} = 40 V dc V_{CE} = 60 V dc	ΔI_{CEX1}	100 percent of initial value or 200 nA dc, whichever is greater.		
7.	Forward-current transfer ratio	3076	V_{CE} = 2.0 V dc, I_C = 1.5 A dc, pulsed (see 4.5.1)	Δh_{FE2}	15 percent change from initial value.		
8.	Collector to emitter voltage (saturated)	3071	I_C = 1.5 A dc, I_B = 150 mA dc, pulsed (see 4.5.1)	$\Delta V_{CE(sat)2}$	50 mV dc change from initial value.		
9.	Thermal impedance	3131	See 4.3.3	$Z_{\theta JX}$		5.4	°C/W

See footnotes at end of table.

TABLE II. Groups A, B, and C electrical measurements 1/ 2/ 3/ 4/ - Continued.

1/ The electrical measurements for table IVa (JANTX and JANTXV) of MIL-STD-19500 are as follows:

a. Subgroup 3, see table II herein, steps 1, 3, 4, and 5.

b. Subgroup 4, see table II herein, steps 1, 3, 4, 5, and 6.

c. Subgroup 5, see table II herein, steps 1, 3, 4, 5, 6, 7, and 8.

2/ The electrical measurements for table IVb of MIL-STD-19500 are as follows:

a. Subgroup 3, see table II herein, steps 1, 3, and 5.

b. Subgroup 6, see table II herein, steps 2, 5, 7, and 9.

3/ The electrical measurements for table V of MIL-S-19500 are as follows:

a. Subgroup 2, see table II herein, steps 1, 3, 4, and 5 (JANS) and steps 1, 3, and 5 (JANTX and JANTXV).

b. Subgroup 3, see table II herein, steps 1, 3, 4, and 5 (JANS) and steps 1, 3, and 5 (JANTX and JANTXV).

c. Subgroup 6, see table II herein, steps 1, 3, 4, 5, 6, 7, and 9 (JANS) and steps 2, 5, 7, and 9 (JANTX and JANTXV).

4/ SOA testing may be performed in lieu of thermal impedance testing herein provided that the appropriate conditions of temperature, time, current and voltage to achieve die attach integrity are submitted to the qualifying activity.

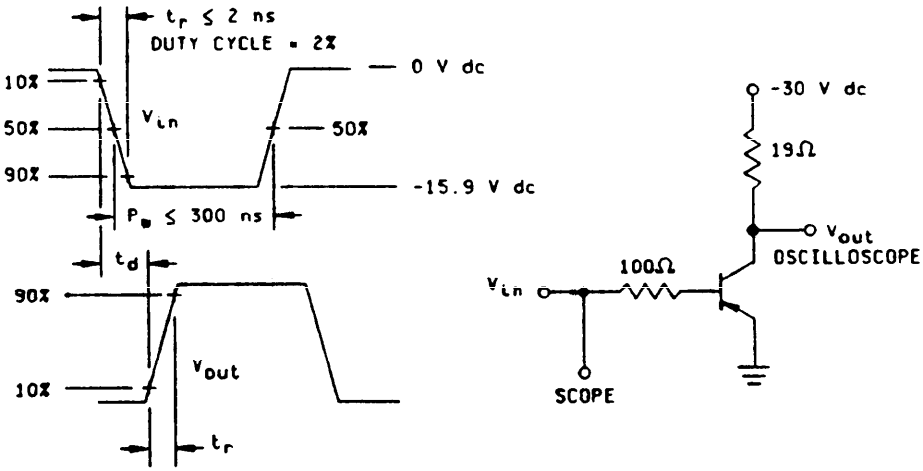


FIGURE 5. Equivalent circuit for measuring delay and rise times.

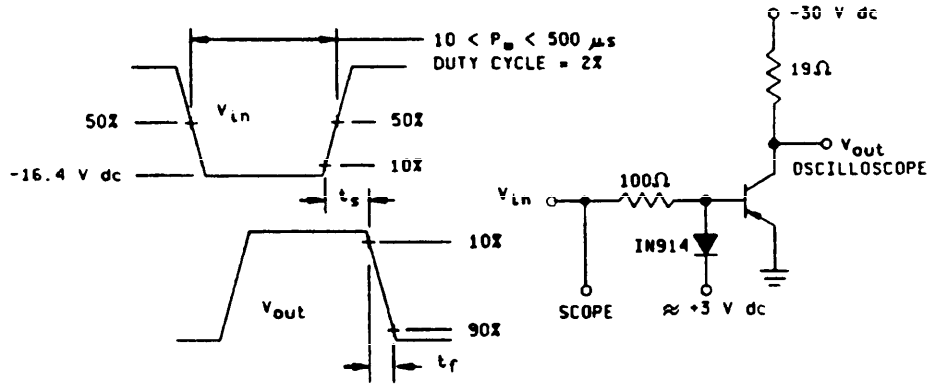


FIGURE 6. Equivalent circuit for measuring storage and fall times.

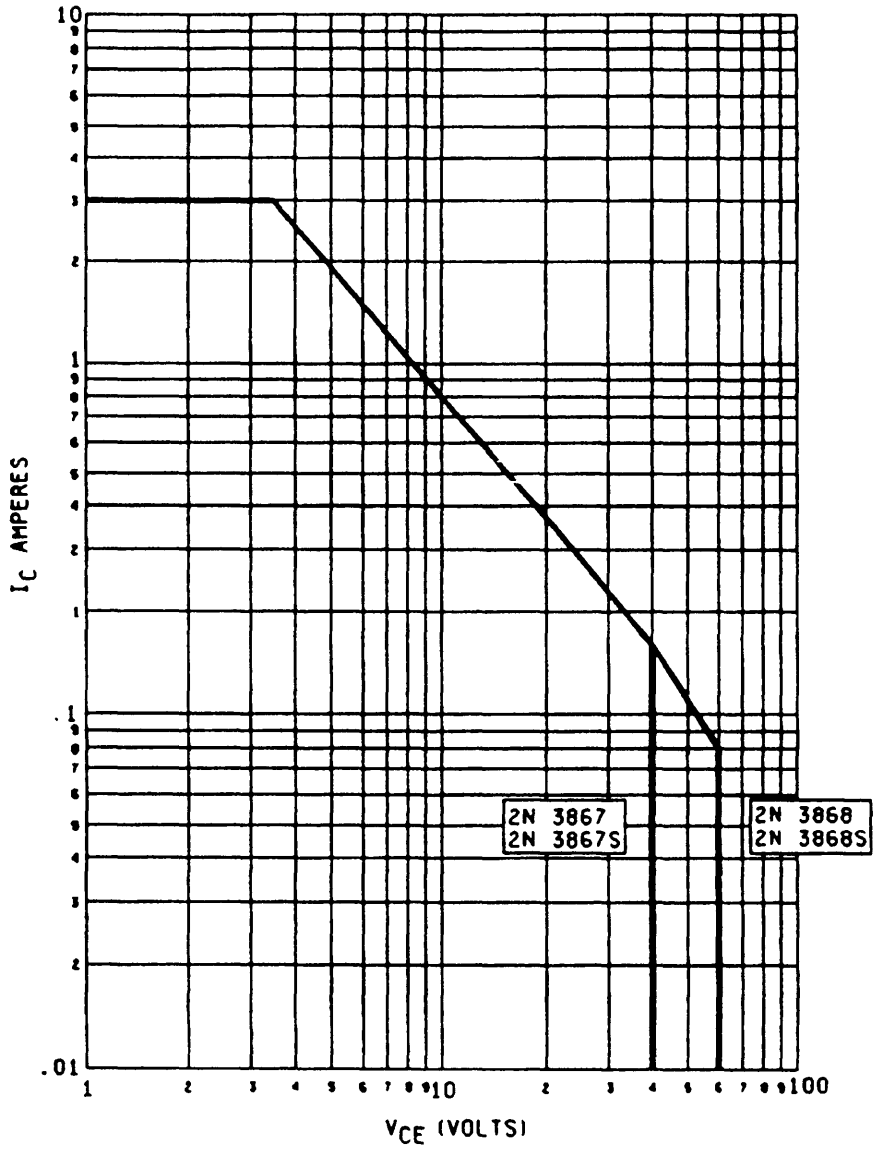


FIGURE 7. Maximum SOA graph (continuous dc).

4.5.2 Thermal resistance. Thermal resistance measurements shall be performed in accordance with MIL-STD-750 method 3131. The following test conditions shall apply:

a. Collector current magnitude shall be 500 mA dc.

b. Collector to emitter voltage magnitude shall be 10 V dc.

c. Reference point temperature shall be $+25°C \leq T_R \leq +35°C$. The chosen reference temperature shall be recorded before the test is started.

d. The maximum limit of $R_{\theta JA}$ shall be 175°C/W.

e. The maximum limit of $R_{\theta JC}$ shall be 17.5°C/W.

5. PACKAGING

5.1 Packaging requirements. The requirements for packaging shall be in accordance with MIL-S-19500.

6. NOTES

(This section contains information of a general or explanatory nature that may be helpful, but is not mandatory.)

6.1 Notes. The notes specified in MIL-S-19500 are applicable to this specification.

6.2 Acquisition requirements. Acquisition documents should specify the following:

a. Issue of DODISS to be cited in the solicitation.

b. Lead finish as specified (see 3.3.1).

c. Type designation, product assurance level and for die acquisition, the JANHC and JANKC letter version should be specified.

6.3 Suppliers of JANHC and JANKC die. The qualified JANHC and JANKC suppliers with the applicable letter version (example, JANHCA2N3867) will be identified on the QPL.

JANC ordering information		
	Manufacturer	
PIN	33178	34156
2N3867	JANHCA2N3867 JANKCA2N3867	JANHCC2N3867 JANKCC2N3867
2N3868	JANHCA2N3868 JANKCA2N3868	JANHCC2N3868 JANKCC2N3868

6.4 Changes from previous issue. Marginal notations are not used in this revision to identify changes with respect to the previous issue, due to the extensiveness of the changes.

6. Drill angle.

CONCLUDING MATERIAL

Custodians:
Army - ER
Navy - EC
Air Force - 17
NASA - NA

Review activities:
Army - AR, AV, MI, SM
Navy - AS, CG, MC
Air Force - 13, 15, 19, 85, 99

Preparing activity:
DLA - ES

(Project 5961-1675)

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

INSTRUCTIONS

. The preparing activity must complete blocks 1, 2, 3, and 8. In block 1, both the document number and revision letter should be given.

2. The submitter of this form must complete blocks 4, 5, 6, and 7.

3. The preparing activity must provide a reply within 30 days from receipt of the form.

NOTE: This form may not be used to request copies of documents, nor to request waivers, or clarification of requirements on current contracts. Comments submitted on this form do not constitute or imply authorization to waive any portion of the referenced document(s) or to amend contractual requirements.

I RECOMMEND A CHANGE:	1. DOCUMENT NUMBER MIL-S-19500/350D	2. DOCUMENT DATE (YYMMDD) 950626

3. DOCUMENT TITLE
SEMICONDUCTOR DEVICE, TRANSISTOR, PNP, SILICON, LOW-POWER TYPES: 2N3867, 2N3867S, 2N3868, AND 2N3868S JAN, JANTX, JANTXV, JANS, JANHC, AND JANKC

4. NATURE OF CHANGE (Identify paragraph number and include proposed rewrite, if possible. Attach extra sheets as needed.)

5. REASON FOR RECOMMENDATION

6. SUBMITTER

a. NAME (Last, First, Middle Initial)	b. ORGANIZATION	
c. ADDRESS (Include Zip Code)	d. TELEPHONE (Include Area Code) (1) Commercial (2) AUTOVON (If applicable)	7. DATE SUBMITTED (YYMMDD)

8. PREPARING ACTIVITY

a. NAME Alan Barone	b. TELEPHONE (Include Area Code) (1) Commercial: 513-296-6048 (2) AUTOVON: 986-6048
c. ADDRESS (Include Zip Code) Defense Electronics Supply Center Attn: DESC-ELDT Dayton, Ohio 45444-5765	IF YOU DO NOT RECEIVE A REPLY WITHIN 45 DAYS, CONTACT: Defense Quality and Standardization Office 5203 Leesburg Pike, Suite 1403, Falls Church, VA 22041-3466 Telephone (703) 756-2340 AUTOVON 289-2340